Global wind market outlook: Offshore and emerging markets offset the slowdown in conventional markets

Shashi Barla  |  1 October 2019
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- **Solar Power**
- **Energy Storage**
- **Grid Edge**

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- Recurring Core Datasets
- Direct Analyst Access
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- **Supply Chain**: Supplier technology strategies, financial health, production capacity, and policy and materials risks
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- **Market Dynamics**: Technology-specific competitive landscape and mid-term growth outlooks
- **Integrated Power Outlooks**: Power system modeling of long-term, all-technology outlooks on supply, demand and price within regional power system
About the Analyst

Shashi Barla, Principal Analyst - Global wind supply chain and technology
Wood Mackenzie Power and Renewables

Shashi has over 10 years of experience in the global wind industry worked within the industry and as external consultant. Shashi leads Wood Mackenzie's Global Wind Turbine Technology and Supply chain practice. He is responsible for global wind turbine technology trends, supply chain trends, turbine OEM market share developments product positioning strategies, global wind operations and maintenance trends and strategies. Shashi renders his knowledge and expertise to Wood Mackenzie’s research and consulting clients. He joined Wood Mackenzie in 2017 and is based in Aarhus, Denmark

Prior to Wood Mackenzie, Shashi was a global key account manager at LM Wind Power, Denmark, and has worked in various roles, primarily in the global market intelligence and strategy function at LM Wind Power. Before LM Wind Power, Shashi was an analyst at GlobalData plc in their wind market intelligence, research and consulting division
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1. Global energy transition outlook to 2040
Power sector capacity investments will shift to wind, solar and storage

3 TW of wind and solar capacity will be added by 2040: six times larger than investments in gas-fired generation

Global power capacity: net change by generation type, 2020 to 2040

Key takeaways

- From 2010-20, markets installed ~1 TW of wind and solar capacity: 65% of total power capacity additions over that time.
- Declining LCOEs and broader power market policy will underpin ~3 TW of wind and solar capacity additions from 2020-40.
- Storage costs continue to fall, supporting ~600 GW of stationary storage capacity.
- Gas expands by ~500 GW over 2020-40, a critical source of lower carbon, flexible generation. China adds nearly 150 GW of capacity in this period.
- Nuclear expands in all regions except in Europe and North America, where ~85 GW needs decommissioning. China and India add ~30 GW of new nuclear in Asia Pacific.
- Coal declines within the OECD and falls to zero in some Western European markets. About 60 GW net additions in Asia Pacific.

Source: Wood Mackenzie; stationary storage forecast does not include pumped hydro.
How much capex is deployed to 2040? Over US$1 trillion a year for both new power generation capacity and fossil supply

Total capex across main energy segments

- **Upside**
  - 3 TW solar and wind added by 2040. More additions or a slower cost decline will increase capex
  - Oil faces investment inertia but operating capacity and reserve depletion continues
  - Expect +20% capex upside to put CCS in place
  - IEA sees +50% more investments in power plants in a 2-degree world

- **Downside**
  - Weaker economic growth
  - Energy efficiency innovation
  - Advance materials and technology solve long-duration storage issues

Risks depend on policy direction and ambition

Note: Power capex based on our proprietary Integrated LCOE Power Modelling using fuel economics, plant technologies, evolution of policies and market design for grid stability. We expect capex (US$/KW) to fall and efficiency improvements to continue. Some markets currently face overcapacity issues, and our modelling assumes capital allocation will be economics-driven system-wide after 2025. ** Power plant refurbishment and upgrades on existing capacity; excludes capex related to T&D in new capacity

Source: Wood Mackenzie
Wind and solar will expand dramatically across key markets – but hydrocarbons still play a critical role

Power is the only commodity that is not ‘global’ – as such, each market is driven by national policies and incentives, and is also heavily influenced by the domestic supply mix

**Power output TWh (global and key markets)**

**Global**
While RES expands rapidly, our modelling expects that other supply sources are crucial for meeting power demand
RES = 24% by 2040

**Europe**
Growth compensates for falling nuclear output and helps push coal from the generation mix; gas flat long term
RES > 40% by 2040

**China**
Acts with growing nuclear and gas output to reduce coal’s share of the generation mix to below ~40% in 2035
RES > 20% by 2040

**US**
Renewables meet incremental growth in power demand
Gas continues to push coal from the US generation mix
RES > 40% by 2040

2. Global onshore and offshore wind outlook 2018-2028e
Global upgrades in Q3 over 10 years overwhelm a 3.2GW near-term downgrade in India

Global grid-connected forecast: 2018 to 2028e

The PTC rush in the US nearly counterbalances the combined 4.5GW downgrade in India and Germany

<table>
<thead>
<tr>
<th>Sub-region*</th>
<th>New Capacity</th>
<th>AAGR</th>
<th>QoQ Δ</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>2019e to 2028e</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North America</td>
<td>93,459MW</td>
<td>2.3%</td>
<td>↑</td>
</tr>
<tr>
<td>Latin America</td>
<td>40,905MW</td>
<td>4.5%</td>
<td></td>
</tr>
<tr>
<td>Northern Europe</td>
<td>61,896MW</td>
<td>7.5%</td>
<td>↑</td>
</tr>
<tr>
<td>Southern Europe</td>
<td>41,851MW</td>
<td>14.8%</td>
<td>↑</td>
</tr>
<tr>
<td>Eastern Europe*</td>
<td>21,515MW</td>
<td>71.0%</td>
<td>↑</td>
</tr>
<tr>
<td>Western Europe</td>
<td>76,912MW</td>
<td>5.4%</td>
<td>↓</td>
</tr>
<tr>
<td>Middle East &amp; Africa</td>
<td>45,042MW</td>
<td>29.7%</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>252,331MW</td>
<td>1.9%</td>
<td></td>
</tr>
<tr>
<td>APeC</td>
<td>104,940MW</td>
<td>14.5%</td>
<td>↓</td>
</tr>
<tr>
<td>Global</td>
<td>738,852MW</td>
<td>5.5%</td>
<td></td>
</tr>
</tbody>
</table>

Note: Arrows are shown in the table if the delta between quarters is greater than or equal to a 1% increase or decrease in the country’s capacity. *See appendix.

Source: Wood Mackenzie
15 of the top 20 countries will more than double their installed base by 2028

Poland’s auction-driven revival headlines QoQ changes in the ranking; overall, a 2GW upgrade for the top 20 markets QoQ, with seven country upgrades tempered by five receiving downgrades this quarter.

Top 20 markets: New capacity 2019e-2028e

Note: (x) refers to QoQ difference in ranking.
Source: Wood Mackenzie
Mid-term 504MW US upgrade as New York doubles offshore wind tender capacity

1GW of offshore wind capacity in France is pushed beyond the outlook period, into 2029 and 2030, as a result of a change in the buildout timelines

Offshore top 20 markets: New capacity ‘19e-’28e

Offshore market forecasts: 2018-2028e

Source: Wood Mackenzie
Growing confidence in Poland and Russia catapult Eastern Europe up the ranking

A 31% upgrade in Russia QoQ as developers push forward amidst realization of localisation strategies; Poland will auction a 2.5GW onshore auction in Q4, stimulating market development and resulting in a 15% upgrade

Top 20 emerging markets: New capacity 2019e-2028e

Emerging markets by region: 2018-2028e

Note: Ranking based on largest growth between 2019 and 2028 and with less than 1GW of capacity installed through YE/2018. AAGR arrow applies to the top 20 emerging markets only.

Source: Wood Mackenzie
1.1GW repowering upgrade QoQ due primarily to Italy (+690MW) and the US (+250MW)

The increasing availability of economic lifetime extension solutions offer owners an alternative to traditional repowering, potentially depressing the volume of repowered assets as LTE solutions become mainstream.

**Top 20 repowering markets by capacity ‘19e-’28e**

<table>
<thead>
<tr>
<th>Country</th>
<th>Capacity (GW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>China, 1</td>
<td>5.7</td>
</tr>
<tr>
<td>Germany, 2</td>
<td>2.9</td>
</tr>
<tr>
<td>Spain, 3</td>
<td>2.7</td>
</tr>
<tr>
<td>United States, 4</td>
<td>2.7</td>
</tr>
<tr>
<td>France, 5</td>
<td>2.7</td>
</tr>
<tr>
<td>Netherlands, 6</td>
<td>2.3</td>
</tr>
<tr>
<td>Italy, 7</td>
<td>1.4</td>
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<tr>
<td>Austria, 8</td>
<td>0.8</td>
</tr>
<tr>
<td>Japan, 9</td>
<td>0.8</td>
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<tr>
<td>Denmark, 10</td>
<td>0.8</td>
</tr>
<tr>
<td>United Kingdom, 11</td>
<td>0.6</td>
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<tr>
<td>India, 12</td>
<td>0.6</td>
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<tr>
<td>Australia, 13</td>
<td>0.4</td>
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<tr>
<td>Ireland, 14</td>
<td>0.4</td>
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<tr>
<td>Portugal, 15</td>
<td>0.3</td>
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<tr>
<td>Sweden, 16</td>
<td>0.3</td>
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<tr>
<td>Belgium, 17</td>
<td>0.3</td>
</tr>
<tr>
<td>South Korea, 18</td>
<td>0.3</td>
</tr>
<tr>
<td>Canada, 19</td>
<td>0.2</td>
</tr>
<tr>
<td>Finland, 20</td>
<td>0.2</td>
</tr>
<tr>
<td>Others</td>
<td>0.4</td>
</tr>
</tbody>
</table>

**Top 20 repowering markets by region: ‘18-’28e**

Note: Gray shading indicates capacity fully repowered from 2019 to 2023. Color shading indicates capacity fully repowered from 2024 to 2028. Does not include refurbishments.

Source: Wood Mackenzie
Demand across regions is dispersing as mature markets hit speed bumps

Stagnating growth is expected in today’s key markets, while emerging regions are picking up speed globally.

New wind power capacity by region (2018-2028e)
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